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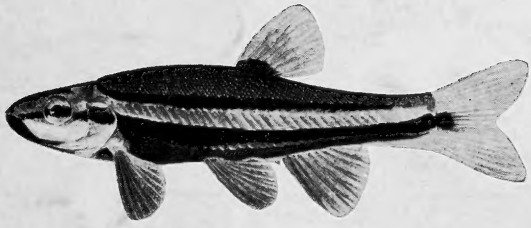
THE AQUARIUM

ISSUED IN THE INTERESTS OF THE STUDY, CARE AND BREEDING OF AQUATIC LIFE



RED-BELLIED DACE
Chrosomus Erythrogaster

One of the most brilliantly colored and generally satisfactory aquarium fishes. Fins, light yellow; base of dorsal fin, red; top of head and back, olive speckled black; top stripe, black; next stripe, light shade of metallic gold; stripe running through eye and into tail, black; belly and lower jaw, brilliant red; gill plates, white

JUNE 1912

Vol. I

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No. 3

THE NEXT NUMBER OF *THE AQUARIUM*

will appear in September

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The American Museum Journal for May contains an illustrated article by Bashford Dean on "The Exhibition of Fishes" in the American Museum, in which modern museum methods for exhibiting fishes are interestingly described. The old method of showing specimens in bottles is being displaced by the more rational one of making casts of the objects and, after coloring them as in life, placing them in groups and in imitation of their natural surroundings. This is in keeping with the groups of mammal and bird life.

The young Milwaukee Society sends its birthday greetings to its four elder sisters. On behalf of the latter, we welcome Milwaukee to the ranks. How soon will Boston follow?

The Fourth Estate, New York, of June 8, 1912, announces us thus:

FISH RAISING

"THE AQUARIUM," a magazine devoted to the interests of the study, care and breeding of aquatic life, has just been established. It is issued monthly at Philadelphia, except during July and August, by the Aquarium Societies of New York, Brooklyn, Chicago and Philadelphia. Eugene Smith of Hoboken, N.J., is the editor-in-chief.

Document No. 110 of the Bureau of Fisheries, Washington, "Methods of Studying the Habits of Fishes, &c.," by Prof. Jacob Reighard, of the University of Michigan, was read at the Fourth International Fisheries Congress, held in September, 1908, at Washington, and was awarded the prize for the best method of observing the habits and recording the life histories of fishes, with an illustrative example. The example selected was the Horned Dace (Semotilus atromaculatus). We recommend this paper as a model for such work and suggest to those intent on studying life histories of fishes to write the Fish Commiission for a copy of *Document No. 110.*

In early numbers we hope to publish several articles by noted naturalists; articles on *live-bearing* fishes, a series on labyrinth fishes, and a continuation of the series on plants started in this number.

Those who read German have a rich field of literature on aquatic topics at their disposal. We hope from time to time to bring some of it to the notice of our readers.

The "Moscow Society of Lovers of Aquaria and House Plants" is an old established Russian Society which issues a bi-monthly magazine from which we shall publish some articles in the future.

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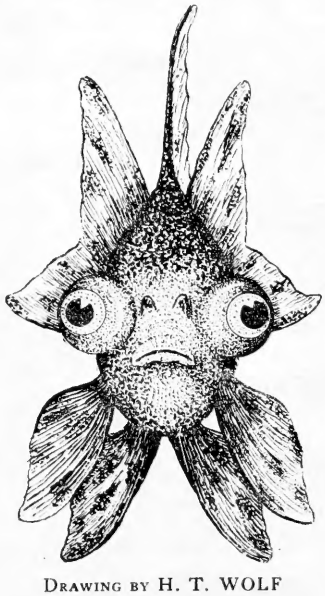
GOLDEN-TENCH
GAMBUSIA-AFFINIS
STICKLE-BACKS

SNAILS

COMMON
RAM'S HORN
POTOMAC
AFRICAN
JAPANESE



DRAWING BY H. T. WOLF

PLANTS

CABOMBA
MYRIOPHYLLUM
ANACHARIS
SAGITTARIA
LUDWIGIA
VALLISNERIA
HORNWORT
POTAMOGETON
SNOW FLAKE
WATER POPPY
WATER HYACINTH
SALVINIA
WATER FERN
LACE LEAF
WATER LETTUCE
UMBRELLA PALMS
CYPERUS PAPYRUS
CYPERUS
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THE AQUARIUM

VOLUME I JUNE, 1912 NUMBER 3

Chrosomus Erythrogaster (Rafinesque)

(Red-Bellied Dace)

WM. KOPP
Chicago

(Based upon "Natural History Survey of Illinois")

This beautiful species, one of the most showy in our waters, is found in northern Illinois. Outside the State it has been reported from Maine and New Brunswick to North Carolina and northern Alabama. From Michigan and the Ohio Valley generally to the streams of Kansas tributary to the Missouri.

It is commonly found only in small clear streams.

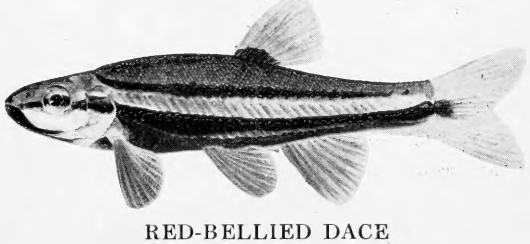
"The minute scales, 77 to 91, in the lateral line, and the two long longitudinal stripes of dark color upon the sides, will readily distinguish the present species from all other species of Cyprinidæ found within our range. Length, 2 to 3 inches; body oblong, moderately compressd, tapering about equally each way from middle of body; color above brownish olive, with a broad vertebral streak of dusky and dark spots forming an indistinct row on upper part of each side; sides marked with two black stripes (faint in females), the upper and narrower one extending from upper corner of gill-cleft nearly straight backward to base of caudal fin, sometimes breaking up into spots of oblique bars on caudal peduncle; the lower stripe broader, extending from snout through eye and along lower portion of sides to end of caudal penducle, followed by a black spot at base of caudal rays; the interspace between lateral bands a bright silvery or satiny cream, tinged with brassy to crimson in males; belly white, overlaid with silvery; females much more obscurely marked than males which in spring coloration have the belly, breast, and chin bright scarlet, and the fins a bright lemon yellow, the dorsal with a large blotch of bright scarlet at its base and the body everywhere minutely tuberculate. Head rather pointed, nose short, pointed, jaws about equal; scales very small."

Its food is evidently obtained by nibbling or sucking the surface slime from stones and other objects on the bottom. It consists mainly of mud containing algæ. In captivity the dace should be fed once a day on fish food and small scraps of raw beef alternately; earth worms chopped up being really better than the beef.

The breeding season falls in May and June, at which time the colors of the male reach their most gorgeous development.

While not especially hardy, this species lives well in the aquarium, where it is indeed a most beautiful object.

NOTE—This fish is not found in the Atlantic Coast drainage, except in the headwaters of some of the rivers.—EDIT.



RED-BELLIED DACE
Chrosomus Erythrogaster

Aquatic Plants Worth Cultivating

W. A. Poyser
Hammond, Indiana

1. The Floating Fern.

Ceratopteris thalictroides, the floating or water-fern, is an anomaly among ferns and one of the few truly aquatic or hydrophytic species. A plant of quiet waters of the tropics, it extends around the world, occurring in the United States in Florida and Louisiana. The plant is usually a rosette of simple (in young specimens) or deeply lobed or divided, more or less bluntly triangular, or deltoid leaves or fronds; the blade is succulent in texture with a thick stem filled with air-cells; the fertile or spore-bearing leaf is erect, longer and more divided into narrow segments, the leaf tissue being sacrificed to spore-production. Aside from propagation by means of spores, the species produces new plants freely from proliferous buds at the edges or occasionally on the surface of the leaves, depending more upon this method than upon the more uncertain sexual process. The viviparous production, asexually of new plants by gemmae, bulblets or buds is not uncommon among plants of the lower orders. In cultivation the floating-fern seldom produces fertile or spore-bearing fronds or leaves, probably because it is usually grown in water too deep to permit the roots to reach the soil.

While as an oxygenator the floating-fern is of no value to the aquarist, as a surface plant it forms a pleasing addition to a collection. Given a sunny position in a warm room, it responds with a wealth of cheerful light green, and multiplies rapidly. The fish seem to find a certain contentment with such a surface covering, and vegetarian species are not averse to an occasional nip at the succulent leaves.

2. The Duckweeds.

Upwards of two thousand years ago there lived in Greece a certain philosopher, who, like Pliny and Aristotle, devoted a portion of his time and talent to the study of nature. The savant to whom I refer was Theophrastus, who wrote a treatise on plants somewhere about B. C. 300. This same Greek was acquainted with an aquatic plant to which he gave the name Lemna. The name was possibly suggested to him by the little island of Lemnos, in the Ægean Sea, apparently floating on the water like a leaf. It is now uncertain as to what the precise plant was to which he gave the name, it might have been a "duckweed" or something else. More recently this name has been given to a group of aquatic plants known to every one who wanders by puddles or ponds.

Several species of duckweed are common to both United States and Europe. There are no real stems and no real leaves, but the whole plant consists of little green fronds which look like leaves and of which one alone constitutes a plant or two or three adhering together, with one or two thread-like rootlets hanging from the underside. The fronds multiply by young ones growing from the edges of those that are mature. The flowers, very simple and minute and rare, are produced from cracks or fissures in the edge of the frond. In general this description covers all our local species except *Wolffia Columbiana.*

The Lesser Duckweed (*Lemna minor*) is our most common species and consists of a tiny oval or round frond, two to five millimeters in diameter, with a single rootlet. *Lemna perpusilla* too has a single rootlet, but the frond is smaller, averaging about the size of that of the smallest *Lemna minor.* The most attractive species, as well as the largest, is *Lemna trisulca.* The fronds are oblong and pointed, growing at right angles in two planes. The Greater Duckweed, *Lemna polyrhiza* of Linnæus, has long since been placed in a separate genus of the family and is now called *Spirodela poly-*

rhiza. This species has disc-like fronds or thalli that may reach a diameter of eight millimeters and has several rootlets. These little "Duckmeats" with apologies for roots, perpetuating their species by branching and separation from the parent, seem far from the accepted idea of a flowering plant, but nevertheless the extremely tiny *Wolffia Columbiana* is the last word in this direction. The plant consists of a minute green globule about one millimeter in diameter, floating just below the surface of the water. It is considered rare, but that may be due to its size and the proneness of the unfamiliar to think it a tiny green seed. The Duckweeds are the smallest flowering plants known to botanists.

The great abundance of some of the species render it unnecessary for the aquarist to exercise any concern about "wintering" his plants, but, without much trouble, a few can be carried over to secure a start in advance of Nature outdoors. Of course, if one secures the rarer or more attractive *trisulca,* he may well go to some trouble. Microscopic life is, of course, present on the rootlets and under side of the fronds. This is well known to the fish, which may be seen to take a plant in their mouths and, in a moment or so, disgorge it. (To be Concluded)

Note on Hearing of Fishes

J. T. Nichols
New York

Dr. G. H. Parker, of Harvard University, has been experimenting with the hearing of fishes. He finds that sounds in the air usually cannot be heard well under water, and that sounds under water usually cannot be heard well in the air. Many fishes show certain proof of distinctly hearing under water sounds.

Dr. Parker's article is Doc. No. 755, Bureau of Fisheries, Wash., "Sound as a Directing Influence in the Movements of Fishes."

A Surgical Case

W. F. DeVoe
Brooklyn

On a certain occasion I happened to stop in the store of one of our local fish dealers, and in looking over his stock, saw a goldfish swimming about with its head down. At the first glance, I thought the fish was affected with bladder trouble, as this is one of the symptoms of that disease. Upon closer examination, however, I found that there was a sack projecting from the lower part of the jaw, and out of curiosity I removed the fish and examined it. The sack felt hard to the touch and I was inclined to believe that it was due to an abnormal growth. However, as a further experiment, I took a pen-knife from my pocket and proceeded to open the sack, and to my great surprise, there dropped out several pieces of gravel, some fully one-eighth inch in diameter. On placing the fish in the tank, it almost immediately righted itself and swam about in a normal manner. Upon inquiring at the store a week later, I found the fish apparently in good health and no trace of its former disability. It seems conclusive that this fish was held downward by the weight of the gravel, but the mystery was how did the gravel happen to lodge in the fish's mouth in such a manner, particularly, as it was entirely covered with the growth. We all know the propensity of goldfish to suck gravel into the mouth, but they usually eject the same immediately after doing so.

According to habitat, fishes fall into two main groups, *marine* and *freshwater,* with an intermediary group inhabiting the transition region of *brackish* water. The last group can live either in salt or fresh water or become adapted to either, or some species may be strictly confined to areas of certain degrees of density or sal nity.

THE AQUARIUM

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Ordinarily the mention of the word aquarium suggests to the hearer a "glass case with fish in" and this is about as simple a definition as one can get from the uninitiated. While this is true, of course, and in a measure a definition for the beginner, still it is only a partial truth, as after having exhausted all *fish* possibilities, the thorough aquarist has only begun his work. There is the life of the insect world, the crustacea, the mollusks, and all the minute forms of life, including that of the micro-organisms, not to speak of the other half of the organic world, that of the plants.

As many of our friends are in the habit of spending extended summer vacations at small lakes, they could get much pleasure for themselves as well as furnish much instruction to others and even help augment the knowledge of aquatic life to no inconsiderable degree, by making systematic neighborhood surveys of their places of retreat and recuperation. In these days of research, no field of human endeavor is barren and no one is so insignificant as not to be able to contribute his mite to the pile of facts from which later the great truths of science are evolved by more masterful minds.

One form of such research is that of plankton investigations, which may be readily made by any one with some spare time.

Sojourners along lake and shore may get as much recreation out of this sort of occupation as out of angling or gunning for sport. As the camera has very largely displaced the gun, so may the plankton net take the place of the rod and reel.

We should be pleased to hear that some of our members or friends would undertake such work this coming summer and give us the benefits of their experiences. Who will do so?

In order to insure earlier publication, the editor asks contributors and business managers to have all matter reach him by the 5th of each month. Hereafter there will be no more copyright illustrations used, unless it be cuts used for advertising purposes only.

The subject matter as well as illustrations are offered for public use. The only request we make is that proper credit be given to both author and magazine by those who may reproduce any of our articles. We want to get the widest possible publicity for our subject. With the June number we reach our time of rest as a magazine and trust that the summer may be productive of many new ventures resulting in renewed activity on the part of all for the coming fall season.

A CORRECTION.—On page 16 of the May number, insert the following line between lines 10 and 11, first column:
miles above Little Falls. Once in a

The oldest known indications of fishes are some small spines or teeth found in Lower Silurian deposits in Russia.

In the Upper Silurian, fossil fishes are very plentiful, but it is only in the Upper Cretaceous deposits that the modern type of fishes becomes known.

Plankton

EUGENE SMITH
Hoboken

When you look into deep waters from shore or from shipboard you rarely see more than the reflection of the sky in its varying moods, or perhaps only one uniform dark mass of water. You know, of course, that there are fish there as well as other living things, but of the vastness of that life, few have any idea.

There is not a drop of that water which is not literally quick with animal and vegetable life. The word *Plankton* is of Greek origin and signifies "that which floats." It includes all this manifold life of the water which is not attached to the soil or which is not to a large extent free of the sway or current of the water. It includes what has motion of its own as well as that simply borne along by wind and wave.

The actively swimming part is also called the *nekton* or *swimming,* while the *plankton proper* is that more at the mercy of the water, the *drifting.* All classes of life are represented.

Thus among the *nekton* are wandering polyps, worms, snails, rotifers, many crustacea like daphnia, cyclops and others, bryozoa, protozoa and others, the larvæ and pupæ of many insects, the adults of a few only.

Among the *plankton* proper are also protozoa, eggs of many kinds, including those of fishes and very largely algæ and other plants either freely floating like the sargasso weed, the blue-green algæ causing the bloom of the water, or the much minuter diatoms, etc., as well as spores and seeds.

The plankton of the sea is called *halobius,* that of the freshwater *limnobios.* The amount of this floating life is simply inconceivable both as to kind and quantity, and it is just this that makes possible the immense productivity of the water in higher, *i. e.* to say, vertebrate life, as it furnishes food to it.

The plankton varies as to its composition and amount according to season, direction and force of wind or current, depth of water, distance from shore, plentitude of certain organisms as attraction for others and for innumerable local reasons, having thus maximal and minimal phases; periodicity, annual, monthly and daily. Much remains to be done to clear up this life of the water and it is within the reach of many to help in this field.

The apparatus for this work are few and simple. A net made of fine silk gauze mounted on a ring or spreader of about eight to twelve inches opening. The bag of the net should taper from this width to a point at the end where it may either be tied with a string or provided with a smaller frame covered with gauze or have a small bottle or detachable box attached to hold what is sifted out from the water. The net is drawn through the water in tow of a row-boat or a slowly moving motor-boat, and after covering a certain distance is hauled in and emptied of its contents, either by scraping the jelly-like mass out of the net or by dumping the detachable bottle into a vessel held ready for the purpose. The bag should be from one to two feet in depth. The towing line should be made of strong linen cord and at least twice as long as the greatest depth to be operated in. To use the net one man may row the boat while the other manages the net. For deep hauls attach a pound weight or more to the end of the line and the net at whatever height above the bottom you wish to explore. The weight drags along the bottom until you haul up the whole to empty it and proceed again. It is well not to make too long a haul, as the gauze becomes easily clogged with the plankton.

For shallow depths or for surface towing the weight may be dispensed with entirely, or to give the net a little steadier pull a light weight may be attached to the line several feet in advance of the net. Between

hauls wash out the net so that the meshes may remain open and let the water through. Besides the net you want also a thermometer to test temperatures and bottles for sampling water at different depths; more extended work would also take depths at the different places (stations) tested as well as lines of direction in which hauls are made. A microscope, or at least a strong magnifying glass, is of great value if you are ready to use it. Otherwise put the mass hauled out into bottles with two per cent. formaline solution for future use. Be sure to label each vial properly or give it a number and describe the locality, date, depth, etc., under a corresponding number in a note book.

If you have not the time or the necessary means to analyze the matter you have collected let some one versed in microscopy or minute life do that part for you, or turn it over to some teacher in a university, or send it to the U. S. Fish Commissioner at Washington. The life of the Swiss and Italian lakes, and of German, English and Scandinavian lakes has been studied in this manner and largely so by the help of aquarists. Whatever little has been done in the United States so far has been mostly through the medium of the Fish Commission.

Let us, too, make some efforts in this direction.

Pointers on Propagation of Daphnias or Water Flea

FRANK J. MEYERS
Bethlehem, Pa.

In order to live, every organism in nature, whether animal or vegetable, must absorb nourishment. If we imitate nature as closely as possible so that an animal may live in its approximately natural environment and feed it the food to which it has been accustomed, it is natural that the animal will thrive and reproduce its species.

It is a recognized fact that the best possible food for goldfish, especially young goldfish, are daphnias. Daphnias in captivity die rapidly, necessitating frequent excursions to the source of supply by the culturist.

Everybody interested in the culture of goldfish probably knows a daphnia when he sees one, but a few words explaining what a daphnia really is and how it reproduces its kind, may not come amiss. Daphnia belongs to the same great class, Crustacea, which includes the crab, lobster and crayfish, from which, however, they differ greatly in size and appearance, tho all have a shell or carapace. Daphnia and its relatives are placed into a sub-class called Entomostraca, which means, in a rough way, an insect in a shell. Entomostraca are further divided into several orders, of which one is called Cladocera. This group includes daphnia and others.

A DAPHNIA
Greatly enlarged

The daphnia is a small animal, more or less transparent, within a bivalvular carapace hinged dorsally on the inside; it has a single eye, from four to six feet having branchiae, or organs of respiration, and large, branched antennae acting as swimming organs.

Daphnias are very prolific, the females preponderating largely over the males and greatly exceeding them in size. Reproduction takes place in two ways:

First, the eggs are received into a large cavity between the back of the animal and its shell, where they are hatched and the young undergo almost their whole development, so as to come forth in a form nearly resembling that of their parent. Soon after their birth a molt or shedding of the shell takes place, and the egg coverings are cast off with it. In a very short time afterwards, another brood of eggs are seen in the cavity, and the same process is repeated, the shell

being again shed after the young have been brought to maturity.

Second, at certain times daphnias may be seen with a dark opaque substance inside the rear part of the shell, which from its resemblance to a saddle is called the ephippium. This contains two oval bodies, each consisting of an ovum covered with a very tough casing enveloped in a capsule which opens like a bivalve shell. The first traces of the ephippium are seen after the third molt as green matter in the ovaries, which differs both in color and appearance from the eggs. After the fourth molt this green matter passes from the ovaries into the open space under the shell on the animal's back and there develops into the ephippium. At the fifth molt this is thrown off and the ephippium, with the two eggs enclosed, floats on the water or sinks into the mud until the next spring, when the young are hatched. This curious provision of nature is destined to afford protection to the eggs, which are to endure the winter's cold. The cast shell of daphnia carries with it not only the covering of the limbs, but of the most delicate hairs and setae which are attached to them.

The young, recently hatched daphnia differs greatly in appearance from the mature animal. It is an odd-looking, sprawling thing, moving by quick jerks, having no bivalve shell, and only three pairs of limbs. This is the food upon which very young goldfish thrive and grow so rapidly. The mature daphnia are too large to be swallowed.

Young goldfish have been observed to follow female daphnia about in order to feed upon the young as they are extruded.

The food of daphnia consists of small particles of decaying animal and vegetable matter and such living animalcules as they can capture and devour. Daphnias are small creatures, and any creatures which they can capture and eat must be very small indeed. Yet the largest part of daphnia food, in the natural environment, consists of just such creatures.

But, if daphnias eat small creatures which cannot be seen with the naked eye, how are we to catch, much less propagate, them to feed to daphnias? The answer is very simple. These small creatures are called Infusoria, because they invariably make their appearance in infusions, especially infusions of hay. They consist of an indiscriminate assemblage of minute, mostly microscopic, animal and vegetable organisms. Some of the more common ones are called Stentor, Chilodon, Paramaecium, Stylonchia, Vorticella, Chaetonotus, etc., all of which are greedily devoured by daphnia.

To keep daphnias alive and have them increase successfully, the following should be observed:

Do not crowd them, on the same principle that successful breeders of fish do not crowd an aquarium with fish. Daphnias, while often found in stagnant water, require oxygen to live; therefore, unless growing plants are present, well aerated water should frequently be added.

The best plan is to keep the daphnias in a receptacle in which water plants are growing and add the water containing the infusoria from time to time as needed. This water is prepared as follows: Place a receptacle containing a quantity of hay and, if possible, some fresh water algae such as Spirogyra, Zygnema, Vaucheria, Oedogonium, etc., in a warm, dark or shaded place for ten days or two weeks. After this all that is needed is to stir the water slightly and dip out a quantity, which is poured into the water containing the daphnias.

By the foregoing means the author has raised countless numbers of daphnias from a few hundred original ones, and can do so in winter as well as in summer.

The Possibilities of the Home Aquarium

Tracy H. Holmes
Chicago

An aquarium with water clear as crystal and capable of sustaining fish life for an

indefinite period without the necessity of being changed is a possibility easily realized. An aquarium of that kind is known as a balanced aquarium and is the result of establishing an equilibrium of certain natural forces.

In stocking an aquarium it is necessary to allow at least a certain amount of water for each fish, to plant in the sand enough growing water plants to furnish as much oxygen as the fish will require, and to add enough tadpoles or snails to devour the accumulation of waste matters, dead leaves and green scums. Such an aquarium will grow more beautiful week by week until it becomes like one of nature's limpid pools, and will need only an occasional cleaning of the glass sides and pebbly bottom, a regular supply of fish food, and an addition of as much water as evaporates. Such a duplication of the natural home conditions of fishes and plants affords problems that tax the skill of the most intelligent, and so makes the aquarium a source of interest to old as well as young. Many aquarists find as much enjoyment in the water plants as in the fishes, and take great delight in learning how to grow scores of beautiful and interesting plants, and in getting them to grow in artistic and effective display, even as is done with land plants by landscape gardeners.

While the goldfish holds the center of the stage in public display, it is not by any means the only available aquarium fish. Interesting and beautiful as goldfishes are, there are many other aquarium fishes, some far more beautiful, many more interesting, most of them more suitable for the home aquarium.

Most of these fishes are tropical and have been imported into Germany, where they have become acclimated to aquarium conditions. Unfortunately most of them have as yet no common names, and so it will be necessary to employ their rather forbidding scientific names. These fishes, of which mention is to be made, are particularly suitable for the home aquarium, first, because they are small fishes and so more contented with narrow quarters; secondly, because they display most wonderful colorations, often bizarre, frequently changeable, according to the emotions of fear, anger or love; thirdly, because they exhibit the most unusual and interesting habits, especially those concerned with their nest building and brooding, and, lastly, because most of them will breed and raise their young in the ordinary home aquarium. This ability and willingness to breed in the aquarium endears these little fishes to fish lovers, for there is a genuine satisfaction and pride in successfully bringing these tiny water babies through the vicissitudes of life to the full perfection of their grace and beauty.

In order to present these fishes more readily to the mind's eye they will be described in groups. According to their method of breathing there are gill-breathers which can breathe the oxygen in the water, and cheek-pouch breathers which can breathe either the oxygen in the water or that in the air itself. As to their methods of reproduction there are oviparous fishes which lay eggs, and viviparous fishes which give birth to fully developed young. As regards their breeding habits there are the plain spawners and the nest builders. Of the nest builders there are those that build nests in the sand or pebbles, and those that construct floating nests made of air bubbles. Space allows of the mention of but a few of the many fishes in these several groups.

The paradise fish (Macropodus Viridi-auratus) is a water and air breather, having besides the usual fish gills a labyrinthine pouch in each cheek by means of which it can utilize the air above whenever the natural supply in the water gives out. These air breathing pouches make it possible for the fish to be revived hours after it has accidentally leaped out of the aquarium onto the floor and become so dry and

stiff as to seem stone-dead. The male paradise fish is gorgeously colored in green, blue, gold and orange, and is subject to surprising changes in the intensity of its hues, especially during the mating season. Paradoxical as it may seem, the ordinary maternal duties, with the sole exception of the laying of the eggs, are performed by the male fish. He builds the floating air-bubble nest, broods over the eggs and young, aerating them by taking them into his mouth, a mouthful at a time, and blowing them up through the water to the nest above.

The saber-tailed fish (Xiphophorus helleri) is a graceful, lithe and active fish, colored with as brilliant a metallic emerald and ruby as that which bedecks the ruby-throated humming bird. The female fish gives birth to some fifty dainty little babies which make a dazzling sight as they dart hither and thither through the vistas of the green waterscape.

Similar to the saber-tailed fish in the breathing habits are the tiny Gambusia and Girardinus fishes, the females of which are scarcely more than an inch long, the males being not over one-quarter the size of the females and so differently colored as to be readily mistaken for an entirely different species of fish. These little fishes have often reared their families of twenty or more in a quart jar, bearing the three consecutive broods within the period of eight weeks. The young mature within three months.

The red chromide (Hemichromis maculata) is an example of the fishes that build a nest scooped out of the sand or pebbles. The eggs are laid on the upper side of a flower pot laid sideways on the bottom for that purpose and are aerated constantly by the parents fanning them with their side fins. The young, upon hatching, are transferred in the mouths of the parents to a nest scooped out of the sand. One pair of these fishes was observed to build two nests, one for use in the daytime, the other at night time. The babies were transferred from one nest to the other twice a day, one parent brooding the young while the other was busy making the unoccupied nest scrupulously clean. It is a wonderfully interesting sight to see these two beautiful fishes swimming about with their large family of inquisitive youngsters, reminding the observer of a family of quail on a search for grasshoppers. In the mating season the lower surface of these fishes becomes tinted blood red while the sides scintillate with emerald facets.

These few illustrations will suffice to suggest the pleasurable possibilities of the home aquarium.

Tadpoles

C. J. Heede
Brooklyn

As many of the aquarium fishes will destroy young snails or the smaller varieties of snails, thus leaving the aquarium without scavengers, some substitute must be provided. Tadpoles, particularly of the larger frogs, will do the same work and will not be so readily eaten by the fish, except when very much smaller than the fish. They are even better for cleaning and purifying an old balanced aquarium with a large growth of algæ, rusty-looking glasses and foul sediment. If put into an aquarium for this purpose they must not be fed as they may neglect their duties if other food is too plentiful. They will eat raw fish and meat if no waste matter is at hand, as in the case of a newly set up aquarium. They also destroy freshwater polyps and if kept with snails will keep the snail shells clear of algæ, and what is even more important will free the snails from the white leeches which at times infest and eventually destroy the snails. Aside from their usefulness in the aquarium tadpoles will be found very interesting to raise from the egg. These eggs, in large bunches can be collected by the individual, or may sometimes be bought from dealers in aquaria supplies, early in the Spring. Enclosed in a circular jelly-like envelope the germ looks like a small round spot of black. When these clumps of spawn are placed in a balanced aquarium and kept in a light, moderately sunny, warm place, the development of the germ will soon be apparent. In a few days the eggs will hatch and the little tadpoles will proceed to eat up their erstwhile home. It takes from four to six months up to two years, or even longer, for tadpoles to reach the perfect frog state.

SOCIETY BULLETINS

Brooklyn Aquarium Society

Regular meetings are held on Fourth Tuesday in every month except June, July and August, at Fairchild Building, 702 Fulton St., at 8 P.M.

Initiation Fee, $1.00
Annual Dues, $2.00

Officers for 1912

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Local Business Manager, Owen H. Smith
702 Fulton Street

Second Summer Outing of the Brooklyn Aquarium Society and friends, Sunday, July 14, 1912, to Grassmere, Staten Island, N.Y. Meet at Staten Island Ferry, Battery Place, New York City, at 9.30 a.m. Trip, including dinner, $1.00.

In the Competition for Old-fashioned Telescopes (Class F)—First Prize awarded S. T. Smith for Male Mottled Telescope (Blue Ribbon). Second Prize awarded S. T. Smith for Female Mottled Telescope (Red Ribbon). Third Prize awarded S. C. Lloyd for Female Mottled Telescope (White Ribbon).

In the Competition for Labyrinth Fishes (Classes K. I.)—First Prize (Blue Ribbon) awarded Dr. Fredk. Schneider for best exhibit of Paradise Fish. Second Prize (Red Ribbon) awarded Herman Rabenau for Paradise Fishes. Third Prize (White Ribbon) awarded Herman Rabenau for Trichogastor fasciatus.

In the Household Aquarium Competition the following awards were made: Sinclair Smith, First Prize (Blue Ribbon), for Balanced Aquaria. Frank K. Fairchild, Second Prize (Red Ribbon), for Balanced Aquarium. Frank B. Johonnot, Third Prize (White Ribbon), for Balanced Aquarium. Herman Rabenau, Fourth Prize, Tri-colored Ribbon of Special Mention.

May 26th—Special Meeting called to meet and confer with Mr. Wm. T. Innes, Jr., President of the Philadelphia Society, with a view to establishing an International Standard for judging goldfishes.

Chicago Fish Fanciers' Club

Regular meetings are held on the Second and Fourth Wednesday of each month, at 809-812 City Hall Square Building, 127-139 North Clark Street, at 8.30 P.M.

Initiation Fee, $1.00
Annual Dues, $1.00

Officers for 1912

President . . . . F. S. Young, 428 West 66th Street
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New York Aquarium Society

Regular meetings are held on the Second Thursday at the German-American School, Sherman Ave., Jersey City, and on the Fourth Friday at the American Museum of Natural History, 77th St. and Central Park West, New York, each month except July and August.

Initiation Fee, $1.00 Dues, $2.00

Officers for 1912

President . . Isaac Buchanan, 143 Liberty Street, New York
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Local Editor, John Treadwell Nichols, Am. Museum of Nat. Hist.
Local Business Manager, Carl P. Ording, 1931 Broadway, New York

June 28th: "Facts and Fallacies of Aquarium Management," by W. L. Brind.
September 12th: Next meeting at Jersey City.

Philadelphia Aquarium Society

Officers for 1912

President and Local Editor, Wm. T. Innes, Jr., 12th & Cherry Sts.
Vice-President . . . Charles Paxson, 2521 N. 9th Street
Treasurer . . . . . Fred Schaefer, 1610 N. 2d Street
Secretary and Bus. Mgr., Howard S. Crees, 3744 N. 13th St.

Milwaukee Aquarium Society

Officers for 1912

President . . . . . C. G. B. Schenck, 105 Grand Avenue
Vice-President . . . . . August Grau, 3110 Grand Avenue
Secretary . . . . . Reverend Paul Roth, 2602 Prairie Avenue
Treasurer . . . . . M. J. C. Steffen, 950 First Street
Librarian . . . . . August W. Pollworth, 1816 Wright Street

June 3d. The Society was organized at 105 Grand Avenue with 19 members.
June 17th. Next meeting.

On your vacation trip you will have opportunities to get in touch with other lovers of nature. Speak of THE AQUARIUM magazine to them and get them to subscribe.